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The period is the value accurately determined by Luizet from observations during an interval of nine years. It has been necessary to add 0^d.002 to the initial epoch in order to make the zero phase coincide with the middle of the primary eclipse. With this adjustment the minimum appears to be symmetrical within the error of observation.

A provisional orbit of this star, differing considerably in some respects from the present result, has been published by Shapley,¹ on the basis of a rough light curve given by Lehnert.

It is probable that the magnitude effect due to reflection and ellipticity, as well as the secondary minimum, might be shown by a very accurate photometric survey of the maximum light. These quantities must all be very small, however, judging from Luizet's observations of the maximum, and their inclusion in the orbital solution would not be likely to alter the computed orbital data to a very appreciable extent.

MARTHA BETZ SHAPLEY.

UNUSUAL NEBULAR SPECTRA

In the course of work with the nebular spectrograph I occasionally meet nebulae having exceptional spectra. The two nebulae N. G. C. 4449 and 4214 are examples. I found N. G. C. 4449—in 1916, slit over major axis of nebula—to possess a continuous spectrum crossed by the strong emission lines typical of gaseous nebulae. There also appear to be present some absorption lines. The bright lines N₁, N₂, H β , λ 4686, H γ and H δ are on the plate; of these N₁, H β and H γ are the strongest and of about equal strength. N₁ and N₂ are apparently of their normal relative intensity. However, the intensity of the nebulium lines relative to the hydrogen series varies in different parts of the nebula, implying variation in the distribution of these substances. The bright lines may possess other peculiarities: unequal shift or breadth in different parts of the nebula. The nebula is receding from us with a speed of about 200 kilometers. A photograph of this nebula has been published by Pease, *Astroph. Jour.*, July, 1917, Plate IIIb.

The nebula N. G. C. 4214 was shown by Mr. Lampland's plates to have the same general appearance as N. G. C. 4449 just discussed, and we both fully expected its spectrum would prove to resemble that

¹Contributions from the Princeton University Observatory, November 3, 1915.

of the latter nebula. It so turned out; and the spectra are so much alike that the description given above for the spectrum of N. G. C. 4449 answers for that of N. G. C. 4214. This nebula is receding with a somewhat higher velocity, of the order of 300 kilometers. The velocities of these two nebulae imply that they are affiliated with the spiral family.

It is encouraging to find the work on nebular spectra approaching a stage where it is becoming possible to infer the type of spectrum from the general appearance of the nebula. Thus a beginning can be made in their spectrographic study by classes and the necessary exposures which are so laborious be made where there is promise of most fruitful results.

Lowell Observatory,
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V. M. SLIPHER.

NOVA PERSEI 1901

Nova Persei has been photographed frequently during the past year with the 40-inch reflector. The star continues to show considerable fluctuations in its light. It has apparently comparatively quiescent periods with intervals of more marked activity. It is possible that the brighter parts of the faint nebulosity near it also undergo variations in brightness but it is difficult to decide that question definitely.

The magnitude of the Nova from the last observations of it in March was about 13.5 (On the scale of magnitudes of professor Barnard's comparison stars near the Nova. The values for the brightness derived from them would probably be roughly one magnitude fainter on the International Scale). Estimates of the brightness of the Nova when it was photographed again in July and August showed it to be about the same magnitudes as the observations of it in March. Marked increase in brightness, from a magnitude to nearly a magnitude and a half, is shown on some of the later photographs, especially those of September 10, October 31, November 1, 7, 8 and 21.

C. O. LAMPLAND.

Lowell Observatory, Flagstaff, Arizona,
November 22, 1918.